

Commonwealth of Kentucky
Division for Air Quality

PERMIT STATEMENT OF BASIS

TITLE V/SYNTHETIC MINOR (DRAFT/PROPOSED) No. V-00-003

DART POLYMERS, INC.

OWENSBORO, KENTUCKY

JUNE 12, 2000

SREENIVAS KESARAJU, REVIEWER

PLANT I.D. # 077-0920-0131

APPLICATION LOG # F872/G570

SOURCE DESCRIPTION:

Dart Polymers, Inc (“Dart”) owns and operates a polystyrene beads, and pellets manufacturing plant and an impregnation facility in Owensboro, Kentucky. This source is a major source for VOC’s and HAP’s. The primary activity at the Owensboro facility is the polymerization of polystyrene, which falls under SIC code 2821. There are three primary production processes at the facility. They are Polystyrene Pellets (Mass Plant), Impregnated Polystyrene beads, Polystyrene Beads (Suspension Plant). Dart has applied for a de-bottle necking project in the Impregnation Plant, which is included in this review. This modification is being issued as a synthetic minor permit, limiting the emissions from this project to 10.51 TPY.

The Mass Plant and the Suspension Plant come under the provisions of 40 CFR 63, Subpart JJJ – *National Emission Standards for Hazardous Air Pollutant Emissions, Group IV Polymers and Resins*.

Dart is a “Existing Affected Source” under Subpart JJJ and the compliance date of September 12, 1999 for Subpart JJJ has been stayed indefinitely except for the “Equipment Leak Provisions”. This is stated in the Section D of the permit – Source Emission Limitations and Testing Requirements. The permit also requires Dart to comply with the new compliance date when published by EPA in the Federal Register.

COMMENTS:

The emission points are described below:

Emission Points 01, 03, 04, and 07: Polystyrene Pellets (Mass Plant)

This process consists of mass polymerization styrene monomer in semi-batch process. The Mass Plant polymerization consists of vessels, numerous pumps to move the reacting mass and heat transfer fluid, Pelletizing equipment, and pellet airveying blower units.

The Mass plant makes crystal polystyrene, GPPS and high impact polystyrene, HPPS. The Mass plant uses ethylbenzene to dilute the styrene polymer mass so that it flows through the equipment more easily. Both ethylbenzene (EB) and styrene are removed from the product by de-volatilization of flashing vapors in a closed vessel and condensing them back into a liquid. Recycled EB is re used in the process.

The Reaction Section of two lines (Line 1 and Line 2) is a Batch Process and of one line is a Continuous Process (Line 3).

The major emissions from this process are VOC and HAP. This process comes under the provisions of 40 CFR 63, Subpart JJJ – National Emission Standards for Hazardous Air Pollutant Emissions, Group IV Polymers and Resins. The Mass Plant is split into five major areas. They are Batch Process vents, Continuous Process vents, Storage Vessels, Wastewater streams, and Equipment leak provisions.

All the process vents in Line 1 and Line 2 are Group 2 process vents. The reactors in Line 1 and Line 2 are vented through Antioxidant tank. The Group 2-process vents are required to establish a “batch cycle limitation” that ensures that Group 2 vents do not become Group 1 vents.

The continuous process vents (Line 3) have an emission limit of 0.0036 kg organic HAP/Mg of product according to 40 CFR 63.1316(c)(1)(i). The reactors are vented to the Condenser vent via Prepoly Tank.

There are seven storage vessels (Group 2 Tanks) which are subject to the requirements of 40 CFR 63, Subpart JJJ in Storage Vessels area. There are no Group 1 storage tanks in this area. The Styrene storage tanks in this area are exempt from the requirements of Subpart JJJ according to 40 CFR 63.1314(d). There are two 1.25 Mgal Styrene Storage tanks which are subject to 40 CFR 60, Subpart Kb.

The Wastewater streams are exempt from the requirements of Subpart JJJ according to 40 CFR 63.1330(e).

40 CFR 63, Subpart JJJ refers to 40 CFR 63, Subpart H for the Equipment Leak provisions. 40 CFR 63, Subpart H applies to the pipeline equipment and contains requirements such as Leak Detection and Repair (LDAR) program.

Emission Factors and Emissions Calculations:

Emissions are calculated from AP-42 emission factors, Engineering Estimates and Source tests.

Compliance with Equipment Leak provisions of 40 CFR 63, Subpart H:

40 CFR 63.1331(a)(4), Notification of Compliance Status - The permittee shall submit the Notification of Compliance Status required by 40 CFR 63.182 (a)(2) and 40 CFR 63.182 (c) of Subpart H within 150 days of applicable compliance date as specified in 63.1311 for the equipment leak provisions (February 28, 1998). The Notification can be submitted as part of the Notification of Compliance Status required by 40 CFR 63.1335(e)(5). [Notification of Compliance Status shall be submitted when EPA publishes the new compliance date in Federal Register].

Periodic Monitoring:

- Subpart JJJ requires the Group 2 batch process vents to establish a batch cycle limitation that ensures that Group 2 vents do not become Group 1 vents or the emissions to stay below 11,800 kg/yr. The permittee in the Compliance Notification will submit this information of being a Group 2 batch process vent. (Note: the compliance date of September 12, 1999 for existing affected sources, except for emission points addressed under 40 CFR 63.1331(Equipment Leak Provisions), which are covered by 40 CFR 63.1311(d), is stayed indefinitely.) The permit does not require the source to comply with the “batch cycle limitation” continuously. The permit

requires that when a “process change” is made, then the permittee will re-evaluate the Group 2 criteria against the respective levels established under the subpart JJJ.

- For Group 2 Continuous process vents, the organic HAP emissions shall stay below 0.0036 kg organic HAP/Mg of product. The emission rate ER kg/Mg is dependent on Emission rate in kg/hr and the rate of polymer produced kg/hr. The emission rate will not change unless the product produced is changed. The permit only requires the permittee to keep track of the rate of polymer produced on hourly basis to see if it stays below the production rate as submitted in Compliance Notification. If the production goes above the production rate as submitted in the Compliance Notification, then the permittee shall re-calculate the emissions in kg/Mg of product.
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Emission Points 10 and 11: Plant 2 – Impregnated Polystyrene Beads Production

The raw material in the production of Impregnated Polystyrene Beads production are Polystyrene Beads manufactured in Plant 3 and Pentane as blowing agent. The impregnated polystyrene beads are used for production of packaging and protecting products, flotation devices, insulation in construction and refrigeration, and hot and cold containers.

Dart has applied for a de-bottle necking project in the Impregnation Plant, which is included in this review. This project authorizes construction of a holding tank. The holding tank will de-bottle neck the production process. Dart has developed a technique to improve the quality of EPS. This process change removes additional n-pentane from the finished product by circulating the slurry in the batchout tank. However, this change results in a longer cycle time that decreases the maximum production rate. The addition of the holding tank will eliminate the added bottleneck, which is the batchout tank, so that the maximum production rate will be identical to what it was before adding the pentane circulation process (Rocket System).

The major emissions from this process are VOC emissions. Regulation 40 CFR 63.1310, Subpart JJJ - Group IV Polymers and Resins applies to the Thermoplastic Product Process Unit (Production of EPS, Expanded Polystyrene). However, according to 40 CFR 63.1310(c)(5), Vessels and equipment storing and/or handling material that contain no organic HAP and/or organic HAP as impurities only are exempted from affected source. EPS contains styrene only as an impurity, according to 40 CFR 63.101, as styrene is present in the raw material polystyrene beads.

40 CFR Subpart DDD is applicable to the VOC emissions from equipment leaks from EPS manufacturing process [40 CFR 60.560(a)(4)]. The Subpart DDD is however not applicable to the process emissions, as the EPS process is not a continuous process [40 CFR 60.560(a)(2)]. The EPS manufacturing is a batch process.

Regulation 401 KAR 60:005, Standards of Performance for New Stationary Sources (40 CFR 60, Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels) is applicable to two 30,000 gal Pentane storage tanks. According to 40 CFR 60.112b(3), a closed vent system with a control device shall be installed meeting the requirements as specified in 40 CFR 60.112b(3)(i) and (ii). The Control Device (Carbon Adsorber) shall be designed and operated to reduce inlet VOC emissions by 95 percent or greater (40 CFR 60.112b(3)(ii)).

The De-bottlenecking project described above is being issued as a synthetic minor permit, limiting the VOC emissions from this project to 10.51 TPY. Dart Polymers has installed voluntary control equipment (Carbon Adsorber) to avoid the requirements of Regulation 401 KAR 51:017, Prevention of Significant Deterioration of Air Quality.

Current Process:

Maximum Uncontrolled emissions 392.6 tons pentane / year
Maximum Controlled emissions 40.4 tons pentane / year (89.7% recovery)

These numbers were based on the '95 fee statement for control efficiency.

Process Modification:

Maximum Uncontrolled emissions 191.4 tons pentane / year
Total (191.4 + 392.6) = 584 tons pentane / year
Total Maximum Controlled emissions 50.2 tons pentane / year (91.4% recovery)
Holding Tank Max Controlled/Potential emissions (50.2 - 40.4) = 9.8 tons pentane / year

The permit requires the emissions from Two (2) Batchout tanks, 20,000 gallons, Two (2) Pentane Storage Tanks, 30,000 gal, Pentane Reclaim Storage, Premix Tank, 14,000 gallons, Holding Tank, which are effected from the modification to stay below 10.51 TPY (Requested by Dart Polymer) to preclude the applicability of Prevention of significant deterioration. The controlled/potential emissions from the modification are 9.8 tons of VOC. The emissions from the modification will always be under the limit of 10.51 TPY as long as the emissions are vented to the carbon adsorber. The permit conditions Dart to vent the emissions from the affected units listed above to vent to the carbon adsorber all the time. The permit also conditions the control efficiency of the carbon adsorber to be at least 95%.

Emission Factors and Emissions Calculations:

Emissions are calculated from emission factors listed in KYEIS. The emission factors used to calculate the VOC emissions from the process modification were the emission factors listed in Kentucky Emission inventory system (KYEIS). The Division did not accept the emission factors and requires the permittee to resubmit the calculations within 3 months of the initial issuance of the permit.

Periodic Monitoring:

The permittee is not required to monitor daily or monthly emissions information to see if the emissions are below 10.51 TPY. The emissions from the modification will always be under the limit of 10.51 TPY as long as the emissions are vented to the carbon adsorber. Thus, permit conditions Dart to vent the emissions from the affected units listed above to vent to the carbon adsorber all the time. The permit also conditions the control efficiency of the carbon adsorber to be at least 95%. This will provide continuing compliance with the emission limit of 10.51 TPY.

Emission Points 02, 05, and 09: Plant 3, Polystyrene Beads (Suspension Plant)

This process consists of mass polymerization styrene monomer in semi-batch process. Styrene monomer will be received by barge and pumped to the 700,000 gallon fixed roof storage tank. The

12,000 gallon tank will meter the styrene monomer into the four chemical polymerization reactors where it will be mixed with water and heated to 190 deg F (Once heated, styrene monomer readily polymerizes). A surfactant will be added in order to control bead size. The reactors will be equipped with water jackets that will allow temperature and hence polymerization control. After the reaction is complete cooling water will be circulated through the reactors. The resulting slurry of sugar grain sized polystyrene beads and water will then be fed to the two 50,000 gallon holding tanks. 32 wt. % HCl (aq) will be added in order to remove the surfactant. The finished product (bead slurry) will then be shipped via tank trucks, trailers and rail cars.

The major emissions from this process are VOC and HAP emissions. This process comes under the provisions of 40 CFR 63, Subpart JJJ – National Emission Standards for Hazardous Air Pollutant Emissions, Group IV Polymers and Resins. The Suspension Plant is split into four major areas. They are Batch Process vents, Storage Vessels, Wastewater streams, and Equipment leak provisions.

All the process vents are Group 2 process vents and are vented through Antioxidant tank. The Group 2-process vents are required to establish a “batch cycle limitation” that ensures that Group 2 vents do not become Group 1 vents.

There are seven storage vessels in Plant 3 are exempt from the requirements of 40 CFR 63, Subpart JJJ. They all are Styrene storage tanks and are exempt from the requirements of Subpart JJJ according to 40 CFR 63.1314(d). All these tanks are subject to 40 CFR 60, Subpart Kb.

The Wastewater streams are exempt from the requirements of Subpart JJJ according to 40 CFR 63.1330(e).

40 CFR 63, Subpart JJJ refers to 40 CFR 63, Subpart H for the Equipment Leak provisions. 40 CFR 63, Subpart H applies to the pipeline equipment and contains requirements such as Leak Detection and Repair (LDAR) program.

Emission Factors and Emissions Calculations:

Emissions are calculated from AP-42 emission factors, Engineering Estimates and Source tests.

Compliance with Equipment Leak provisions of 40 CFR 63, Subpart H:

40 CFR 63.1331(a)(4), Notification of Compliance Status - The permittee shall submit the Notification of Compliance Status required by 40 CFR 63.182 (a)(2) and 40 CFR 63.182 (c) of Subpart H within 150 days of applicable compliance date as specified in 63.1311 for the equipment leak provisions (February 28, 1998). The Notification can be submitted as part of the Notification of Compliance Status required by 40 CFR 63.1335(e)(5). [Notification of Compliance Status shall be submitted when EPA publishes the new compliance date in Federal Register].

Periodic Monitoring:

See the Periodic Monitoring above under the Polystyrene Pellets plant (Mass Plant).

Emission Points 12 (Two 14.6 mmBTU/hr boilers), 13 (Two 29.29 mmBTU/hr boilers), and 14 (One 25 mmBTU/hr boiler):

There is no control equipment at these units. The emission factors have been taken from AP-42.

401 KAR 60:005, *New Source Performance Standards (40 CFR 60.40c to 60.48c, Subpart Dc, Standards of performance for small industrial-commercial-institutional steam generating units)* is not applicable to emission points 12 and 13, as these units are constructed prior to June 9, 1989. 401 KAR 59:015, *New indirect fired heat exchangers*, applies to the emission points 12, 13 and 14. 40 CFR 60, Subpart DC, is applicable to emission point 14, as this unit is constructed after June 9, 1989. However, there are no applicable standards for natural gas fired boiler according to 40 CFR 60 Subpart DC.

EMISSION AND OPERATING CAPS DESCRIPTION:

Dart has applied for a de-bottle necking project in the Impregnation Plant, which is included in this review. This modification is being issued as a synthetic minor permit, limiting the emissions from this project to 10.51 TPY. The emissions from the modification will always be under the limit of 10.51 TPY as long as the emissions are vented to the carbon adsorber. The permit conditions Dart to vent the emissions from the affected units listed in Plant 2 above to vent to the carbon adsorber all the time. The permit also conditions the control efficiency of the carbon adsorber to be at least 95%.

OPERATIONAL FLEXIBILITY:

Dart has requested that the reactors in line 1, reactors in line 2 and the rubber dissolver tanks should be able to vent through their dedicated vents and not through the Anti-Oxidant tank as listed in the Title V permit. This will be done on regular basis or when bringing process systems down. The venting will not change any applicable requirements. All the requirements including the applicability of 40 CFR 63, Subpart JJJ and the emission limits will continue to apply as described in Section B (Pages 2 through 5) of the permit.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has not incorporated these provisions in its air quality regulations.